What’s New In WebGL

• WebGL Ecosystem Updates
• WebGL 2.0 Compute
• Key extensions requested by customers
  - KHR_parallel_shader_compile
  - Multi-draw
  - WEBGL_video_texture
  - BaseVertex / BasenInstance
• Speaker Lineup
WebGL Ecosystem Updates

Lots of cool new WebGL projects released over the past year! A few examples:

- **Basis Universal** released as open-source!
  - WebAssembly module - works in all browsers
  - glTF demo, texture demo
  - Using Basis Textures in Three.js

- **Classic Minecraft**!
- **Google Earth via WebAssembly**!
- **Doom 3 WASM** - new performance improvements!
- **noclip.website**
- Newton Protocol, WebGL 2.0 demo, won the PC 4K category at the Revision 2019 competition! ([pouet.net](http://pouet.net), [YouTube](https://www.youtube.com))
- **Fluid simulation by PavelDoGreat** ([announcement](https://www.pouet.net/announcement/211119), [original Codepen](https://pouet.net/211119))
- **Wolfenstein Raytraced with WebGL 1.0**
- [https://play.gl/](https://play.gl/)
WebGL Ecosystem Updates

- Dust, a Rust-based game engine (announcement)
- Cesium announced Series A Investment and spin-out!
- Three.js path tracing renderer
  - Geometry showcase, Ocean and sky rendering
- Shadertoys: Sanctuary (2), Doodling #7: Speed, Torus pipes (announcement)
  - Follow @Shadertoy!
- https://hair-simulation.lusion.co/
- tuqire’s webcam outline (source, announcement)
- Crystal demo
- Fluid Geometry
- Why you should start to create 3D content for the web
WebGL Ecosystem Updates

- Heart arrhythmia simulations done in WebGL! By researchers from Georgia Tech and the Rochester Institute of Technology.
  - [http://advances.sciencemag.org/content/5/3/eaav6019](http://advances.sciencemag.org/content/5/3/eaav6019)
  - [http://chaos.gatech.edu/eaav6019/](http://chaos.gatech.edu/eaav6019/)
  - Another paper using the same library they developed, but with examples of chaos and fractals:
WebGL Ecosystem Updates

• Demo: Xeokit
  - Conference center demo
  - Purpose-built open source SDK for high-detail 3D engineering visualization on the Web.
  - Loads metadata alongside each model (eg. BIM metadata) to classify and assist navigation of the 3D objects.
  - Loads models from glTF2, OBJ, STL, 3DXML and XKT (a native binary format optimized for xeokit).
  - Based on lessons learned during ten years developing WebGL engines for STEM.
  - Currently used by around eight BIM software firms, some of which sustain its development through commercial licensing fees.
WebGL Ecosystem Updates

- WebGL working group is focusing on conformance - getting all implementations to pass top-of-tree conformance tests
  - James Darpinian, Google; Jeff Gilbert, Mozilla; Lin Sun, Intel
- Many corner cases of the OpenGL and OpenGL ES specs have been uncovered and resolved since last snapshot
- Will lead to improved portability of applications
- Also resolving bug reports from customers and turning these into conformance tests where possible
- Please keep these coming!
- Collaborating with Apple to integrate ANGLE into Safari’s WebGL backend
  - Follow this WebKit bug for updates
WebGL 2.0 Compute

- Single largest recent WebGL advancement is support for compute shaders
- Developed by Intel’s Web Graphics team in Shanghai
  - Jiajia/Jiawei/Xinghua/Jie/Jiajie/Yunfei/Yizhou/Yunchao
- Adds OpenGL ES 3.1 compute shaders to WebGL
- Draft specification is online
- Available in current Chromium builds on Windows and Linux
Trying WebGL 2.0 Compute

- Use Chrome Canary on Windows or Dev Channel on Linux
- On Windows:
  - `--use-cmd-decoder=passthrough --enable-webgl2-compute-context`
  - Optionally: `--use-angle=gl`
- On Linux:
  - `--use-cmd-decoder=passthrough --enable-webgl2-compute-context`
    - `--use-gl=angle`
- First ComputeBoids demo from Intel
- More compute shader demos coming online
- Good way to start experimenting with compute shaders on the web today
- Discuss on webgl-dev-list
KHR_parallel_shader_compile

- WebGL extension was developed by Intel’s Web Graphics team in Shanghai
  - Jie Chen
- Fixes longstanding customer complaints about slow WebGL shader compiles
  - Compiles become async and parallel with small app changes
- Shipping today in Chrome on Windows, other platforms/browsers soon!
Multi-Draw

- **WEBGL_multi_draw** and **WEBGL_multi_draw_instanced** decrease the CPU overhead of issuing draw calls
  - Austin Eng and Kai Ninomiya, Google
- Application receives gl_DrawID in shaders; works well with uniform updates batched into UBOs with WebGL 2.0
- Supported via emulation even on platforms without the native multi-draw extensions
- **Results from microbenchmarks** are impressive: 3-6x improvements in common case, up to 70x (!) in some situations
- Test in Chromium with --enable-webgl-draft-extensions
- Please tell us how it’s working for you on [webgl-dev-list](mailto:)
WEBGL_video_texture

- **Extension** being developed by Intel’s Web Graphics team in Shanghai
  - Shaobo Yan

- Supports zero-copy video uploads into WebGL textures
- **Implementation** is in Chromium behind --enable-webgl-draft-extensions
- Seeing up to 47% speedups on some content
- Will appreciate your feedback; please watch Khronos’ [public_webgl](#) list
BaseVertex and Baseline Instance Extensions

- Customer requests for both BaseVertex and BaselineInstance versions of instanced draw calls
- Extensions under active development by Shrek Shao, Google
- Work is ongoing under this Chromium bug; follow it for updates
Speaker Lineup

- Alban Denoyel, Sketchfab
- Christian Stein, Fraunhofer
- David Koerner, ESRI
- Gary Hsu, Microsoft
- Ib Green and Tarek Sherif, Uber
- Ricardo Cabello, Google
- Will Eastcott, PlayCanvas
- Yang Gu, Intel